

$C222$

No. 21

 $C222$
 D_2^6
Generators selected $(1); \tau(1,0,0); \tau(0,1,0); \tau(0,0,1); \tau(\frac{1}{2},\frac{1}{2},0); (2); (3)$
General position

 Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 $(0,0,0)+ (\frac{1}{2},\frac{1}{2},0)+$

 8 l 1

 (1) x, y, z (2) \bar{x}, \bar{y}, z (3) \bar{x}, y, \bar{z} (4) x, \bar{y}, \bar{z}
I Maximal translationengleiche subgroups

[2] $C121$ (5)	(1; 3)+	
[2] $C211$ (5, $C121$)	(1; 4)+	$-\mathbf{b}, \mathbf{a}, \mathbf{c}$
[2] $C112$ (3, $P112$)	(1; 2)+	$1/2(\mathbf{a}-\mathbf{b}), 1/2(\mathbf{a}+\mathbf{b}), \mathbf{c}$

II Maximal klassengleiche subgroups

• Loss of centring translations

[2] $P2_12_12$ (18)	$1; 2; (3; 4) + (\frac{1}{2}, \frac{1}{2}, 0)$		
[2] $P2_122$ (17, $P222_1$)	$1; 3; (2; 4) + (\frac{1}{2}, \frac{1}{2}, 0)$	$\mathbf{b}, \mathbf{c}, \mathbf{a}$	$0, 1/4, 0$
[2] $P22_12$ (17, $P222_1$)	$1; 4; (2; 3) + (\frac{1}{2}, \frac{1}{2}, 0)$	$\mathbf{c}, \mathbf{a}, \mathbf{b}$	$1/4, 1/4, 0$
[2] $P222$ (16)	$1; 2; 3; 4$		

• Enlarged unit cell

[2] $\mathbf{c}' = 2\mathbf{c}$			
$I2_12_12_1$ (24)	$\langle 3; 2 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$3/4, 0, 0$
$I2_12_12_1$ (24)	$\langle (2; 3) + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$3/4, 0, 1/2$
$I222$ (23)	$\langle 2; 3 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$I222$ (23)	$\langle 2; 3 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$0, 0, 1/2$
$C222$ (21)	$\langle 2; 3 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$C222$ (21)	$\langle 2; 3 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$0, 0, 1/2$
$C222_1$ (20)	$\langle 3; 2 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$0, 0, 1/2$
$C222_1$ (20)	$\langle (2; 3) + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
[3] $\mathbf{a}' = 3\mathbf{a}$			
$C222$ (21)	$\langle 2; 3 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$C222$ (21)	$\langle (2; 3) + (2,0,0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	$1, 0, 0$
$C222$ (21)	$\langle (2; 3) + (4,0,0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	$2, 0, 0$
[3] $\mathbf{b}' = 3\mathbf{b}$			
$C222$ (21)	$\langle 2; 3 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
$C222$ (21)	$\langle 3; 2 + (0,2,0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	$0, 1, 0$
$C222$ (21)	$\langle 3; 2 + (0,4,0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	$0, 2, 0$
[3] $\mathbf{c}' = 3\mathbf{c}$			
$C222$ (21)	$\langle 2; 3 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$C222$ (21)	$\langle 2; 3 + (0,0,2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	$0, 0, 1$
$C222$ (21)	$\langle 2; 3 + (0,0,4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	$0, 0, 2$

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
$C222$ (21)	$\langle (2; 3) + (2u, 0, 0) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$			
$C222$ (21)	$\langle 3; 2 + (0, 2u, 0) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$			
$C222$ (21)	$\langle 2; 3 + (0, 0, 2u) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

I Minimal translationengleiche supergroups

[2] $Cmmm$ (65); [2] $Cccm$ (66); [2] $Cmme$ (67); [2] $Ccce$ (68); [2] $P422$ (89); [2] $P4_22$ (90); [2] $P4_222$ (93); [2] $P4_22_12$ (94);
 [2] $P\bar{4}m2$ (115); [2] $P\bar{4}c2$ (116); [2] $P\bar{4}b2$ (117); [2] $P\bar{4}n2$ (118); [3] $P622$ (177); [3] $P6_222$ (180); [3] $P6_422$ (181)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $F222$ (22)

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P222$ (16)

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No. 22

F222

- Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$ $F222$ (22)	$\langle (2; 3) + (2u, 0, 0) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$ $F222$ (22)	$\langle 3; 2 + (0, 2u, 0) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$ $F222$ (22)	$\langle 2; 3 + (0, 0, 2u) \rangle$ prime $p > 2; 0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

I Minimal translationengleiche supergroups

[2] $Fmmm$ (69); [2] $Fddd$ (70); [2] $I422$ (97); [2] $I4_122$ (98); [2] $I\bar{4}m2$ (119); [2] $I\bar{4}c2$ (120); [3] $F23$ (196)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

none

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P222$ (16)